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EXAMINER	
KIBLER, VIRGINIA M	

ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/782,626	HAKIM ET AL.	
	Examiner	Art Unit	
	Virginia M Kibler	2623	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 April 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-87* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-87* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. The amendment received on 4/2/04 has been entered. Claims 1-87 remain pending.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 29 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer ("Intelligent X-Ray Inspection for Quality Control of Solder Joints").

Regarding claims 29 and 72, Neubauer discloses obtaining image data relating to at least part of an electrical circuit (Figure 8a), the electrical circuit being formed on both sides of a substrate, and enhancing the image data to provide enhanced inspection output information which decreases artifacts in the image data (Figures 8b and c). Neubauer discloses providing a separation of superposition in certain board areas caused by double-sided boards (Abstract; Sect. IV). While Neubauer does not expressly state a non-opaque substrate, it would have been obvious in light of his disclosure. Neubauer discloses enhancing the image data to provide enhanced inspection output information which decreases superposition, thereby decreasing artifacts resulting from a non-opaque characteristic of a non-opaque substrate.

4. Claims 1, 3-5, 14-16, 44, 46-48, and 57-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer ("Intelligent X-Ray Inspection for Quality Control of Solder Joints") in view of Roder (6,373,917).

Regarding claims 1 and 44, Neubauer discloses obtaining first image data relating to at least a part of an electrical circuit, obtaining second image data generally corresponding to the part of the electrical circuit, the second image data including at least some image data that is different from the first image data (Abstract; Sect. IV), modifying the first image data by employing the second image data (Sect. IV-A) thereby to produce an enhanced representation of the electrical circuit for inspection (Figure 8). While Neubauer discloses solder joint inspection, he does not appear to expressly state inspecting the enhanced representation with reference to a reference representation of the electrical circuit to detect defects in the electrical circuit. However, Roder discloses comparing laminographic images of a circuit board to a reference representation to detect defects (Abstract). Neubauer and Roder are combinable because they are from the same field of endeavor of circuit board inspection. At the time of the invention, it would have been obvious to a person of ordinary skill to have modified the separated image (Figure 8) disclosed by Neubauer to include further processing of inspecting the separated image with reference to a reference representation to detect defects. The motivation for doing so would have been because it is well known methodology routinely utilized in the art to detect defects. Therefore, it would have been obvious to combine Neubauer with Roder to obtain the invention as specified in claims 1 and 44.

Regarding claims 3 and 46, Neubauer discloses enhancing contrast between at least some parts of the second image data representing corresponding parts of the electrical circuit (Sect. IV-A; Figure 8).

Regarding claims 4 and 47, Neubauer discloses the enhancing contrast is non-linear (page 116, Col. 1, para. 2 and Col. 2, para. 5).

Regarding claims 5 and 48, Neubauer discloses the enhancing includes redefining substrate portions not overlaying conductors in the second image data as opaque substrate portions, thus generally eliminating any distinction between substrate portions which overlay conductors and portions which do not (Figure 8).

Regarding claims 14 and 57, Neubauer discloses determining the first image data approximate locations of transitions between image regions having distinguishable optical characteristics and modifying by removing undesired ones of the transitions (Figure 8).

Regarding claims 15 and 58, Neubauer discloses an enhanced representation of the electrical circuit but does not appear to specify a binary representation. However, this is well known in the art and routinely utilized for contrast enhancement. It would have been obvious to one of ordinary skill in the art to have modified the enhanced representation disclosed by Neubauer to include further processing to obtain a binary representation because it creates a high-contrast image thereby resulting in more accurate inspection.

Regarding claims 16 and 59, Neubauer discloses the enhanced representation is a representation of contours in the electrical circuit, which indicate approximate locations of transitions between regions in the electrical circuit exhibiting distinguishable optical characteristics (Figure 8).

5. Claims 30 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer ("Intelligent X-Ray Inspection for Quality Control of Solder Joints") as applied to claims 29 and 72 above, and further in view of Caspi et a. (5,774,573).

Regarding claims 30 and 73, Neubauer discloses an electrical circuit formed on both sides of a substrate, but does appear to recognize the artifacts including at least part of an image from a substrate portion not having deposited thereon one of the first and second conductors. However, Caspi discloses it is known to include enhancing contrast between at least some parts of the image data representing corresponding parts of the electrical circuit thereby decreasing artifacts (Col. 3, lines 57-65; Col. 8, lines 7-30). Caspi further discloses that more complex circuit boards and more exotic substrate material will contain regions where the contrast between the tracks and substrate differ (Col. 13, lines 6-22) and it is necessary to redefine certain regions as substrate portions (Col. 13, lines 23-59). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the enhancement of the image disclosed by Neubauer to include decreasing artifacts from a substrate portion as taught by Caspi because it provides greater accuracy and reliability in the inspection of circuit.

6. Claims 8-10, 17-23, 51-53, and 60-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer ("Intelligent X-Ray Inspection for Quality Control of Solder Joints") and Roder (6,373,917) as applied to claims 1 and 44 above, and further in view of Caspi et al. (5,774,573).

Regarding claims 8, 9, 51, and 52, Neubauer and Roder do not appear to recognize convolving the first image with a function. However, Caspi teaches that it is known to convolve an image with an approximation of a two-dimensional second derivation (Laplacian) of a

Gaussian function (Col. 8, lines 7-30; Col. 9, lines 28-30). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the images disclosed by Neubauer and Roder to include convolving the first image with an approximation of a Laplacian of a Gaussian function as taught by Caspi because it is well known methodology routinely implemented in the art for determining the location of the edges resulting in more accurate inspection.

Regarding claims 10, and 53, Neubauer, Roder, and Caspi do not appear to specify that the modifying is carried out following the convolving. However, it would have been an obvious matter of design choice to specify the order of the modifying and convolving disclosed by Neubauer, Roder, and Caspi.

Regarding claims 19-21 and 62-64, the arguments analogous to those presented above for claims 14-16 are applicable to claims 19-21, respectively, and 62-64, respectively.

Regarding claims 17, 22, 60, and 65, Neubauer and Roder do not appear to recognize the spatial resolution of the enhanced representation is greater than the spatial resolution of the first and second image data. However, Caspi discloses the enhanced representation has a spatial resolution greater than the original spatial resolution (Col. 2, lines 66-67, Col. 3, lines 1-16). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the images disclosed by Neubauer and Roder to include the enhanced representation with a greater spatial resolution because the larger the final pixel size involved in acquiring data from an object permits objects to be scanned faster, and either reduces the amount of light required or permits the same amount of light to be used thus decreasing the effect on accuracy of noise due to statistical variations in the amount of light (Col. 3, lines 1-16).

Regarding claims 18, 23, 61, and 66, Neubauer and Roder do not appear to recognize the gray scale of the enhanced representation has a dynamic range smaller than the dynamic range of the first and second image data. Caspi discloses the enhanced representation has a gray scale whose dynamic range is reduced as compared with the dynamic range of the original data (Col. 13, lines 6-59). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the images disclosed by Neubauer and Roder to include enhanced representation with a reduced dynamic range as taught by Caspi because it is well known in the art and allows for increased differentiation between the substrate and the conductors.

7. Claims 2, 6, 7, 24, 25, 45, 49, 50, and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer ("Intelligent X-Ray Inspection for Quality Control of Solder Joints") and Roder (6,373,917) as applied to claims 1 and 44 above, and further in view of Hara et al. (4,692,690).

Regarding claims 24 and 67, Neubauer and Roder do not appear to recognize the first and second images are acquired with at least two different types of optical detectors. However, Hara discloses the first and second images are acquired with at least one imager 11 comprising at least two different types of optical detectors 19, 15' arranged to view at least a portion of the electrical circuit illuminated by at least one illuminator (Figure 2). Therefore, it would have been obvious to one of ordinary skill in the art to have modified acquiring images as disclosed by Neubauer and Roder to include different optical detectors as taught by Hara because it is well known in the art and provides a means of obtaining images with different spectral sensitivities to enhance defect detection.

Regarding claim 25, the arguments analogous to those presented above for claim 24 are applicable to claim 25. Hara discloses the first and second images are generally spatially coincidental and each of the first and second images are in a different spectral range (Col. 9, lines 28-35).

Regarding claims 2 and 45, Neubauer and Roder do not appear to recognize the first and second images having different spectral ranges. However, Hara discloses the first and second images are acquired with at least one imager 11 comprising at least two different types of optical detectors 19, 15' arranged to view at least a portion of the electrical circuit illuminated by at least one illuminator (Figure 2). Hara discloses the first and second images are generally spatially coincidental and each of the first and second images are in a different spectral range (Col. 9, lines 28-35). Therefore, it would have been obvious to one of ordinary skill in the art to have modified acquiring images as disclosed by Neubauer and Roder to include obtaining images with different spectral ranges as taught by Hara because it is well known in the art and provides a means of obtaining images with different spectral sensitivities to enhance defect detection.

Regarding claims 6, 7, 49, and 50, the arguments analogous to those presented above for claims 3 and 4 are applicable to claims 6, 7, 49, and 50.

8. Claim 68 is rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer ("Intelligent X-Ray Inspection for Quality Control of Solder Joints"), Roder (6,373,917) and Hara et al. (4,692,690) as applied to claim 67 above, and further in view of Bishop et al. (5,524,152).

Regarding claim 68, the arguments analogous to those presented above for claim 25 are applicable to claim 68. Neubauer, Roder, and Hara do not recognize including three types of

detectors. However, Bishop et al. ("Bishop") teaches that it is known to include three detectors (Figure 4A), each of which is operative to output a generally spatially coincidental image (Col. 6, lines 62-67, Col. 7, lines 1-2). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the detectors disclosed by Neubauer, Roder, and Hara to include three detectors as taught by Bishop because it is well known and routinely implemented in the art in order to extend to multicolor systems.

9. Claims 11-13 and 54-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Neubauer ("Intelligent X-Ray Inspection for Quality Control of Solder Joints"), Roder (6,373,917), and Hara et al. (4,692,690) as applied to claims 6 and 49 above, and further in view of Caspi et al. (5,774,573).

Regarding claims 11-13 and 54-56, the arguments analogous to those presented above for claims 8-10 are applicable to claims 11-13, respectively, and 54-56, respectively.

10. Claims 26, 27, 31, 32, 34-43, 69, 70, 74, 75, and 77-87 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al. (4,692,690) in view of Caspi et al. (5,774,573).

Regarding claims 26 and 69, Hara et al. ("Hara") discloses inspecting electrical circuits including obtaining first image data relating to at least a part of an electrical circuit (Col. 8, lines 46-59), obtaining second image data generally corresponding to the part of an electrical circuit, where second image data includes at least some image data that its different from the first image data (Col. 8, lines 59-68, Col. 9, lines 1-30), modifying the first image data by employing the second image data thereby to produce an enhanced representation of the electrical circuit (Col. 9, lines 3-21). Hara does not appear to expressly recognize enhancing the contrast by non-linearly combining the images. However, Caspi et al. ("Caspi") teaches that it is known to include

enhancing contrast by non-linearly combining an image (Col. 3, lines 57-65; Col. 8, lines 7-30; Col. 9, lines 28-30). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the images disclosed by Hara to include enhancing the contrast as taught by Caspi because it is well known methodology routinely implemented in the art for the detection of defects resulting in more accurate inspection.

Regarding claims 27 and 70, Caspi teaches that it is known to include a circuit board with conductors on both sides (Col. 1, lines 20-29). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the circuit board disclosed by Hara to include conductors on both side as taught by Caspi because it is well known in the art and is a matter of design choice. Note, Caspi discloses enhanced contrast representation includes information providing enhanced contrast between representations of first conductors and of the substrate (Col. 5, lines 33-38).

Regarding claims 31 and 74, the arguments analogous to those presented above for claim 26 are applicable to claims 31 and 74. Caspi discloses applying a high-sure/low-sure region classifier (Col. 18, lines 38-56). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the images disclosed by Hara to include supplying the non-linearly enhanced image to a high-sure/low-sure region classifier as taught by Caspi because it is a methodology routinely implemented in the art in order to classify the pixels thereby increasing the accuracy of the inspection.

Regarding claims 32 and 75, Caspi discloses that it is known to include a printed circuit board with both sides of the substrate having conductive tracks (Col. 1, lines 20-29). Caspi further discloses that more complex circuit boards will contain regions where the contrast

between the tracks and substrate differs (Col. 13, lines 6-22) and it is necessary to redefine certain regions as substrate portions (Col. 13, lines 23-59). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the enhanced representation disclosed by Hara and Caspi to include redefining image data as substrate portions overlaying conductors because it increases the accuracy of the inspection of double sided circuit boards.

Regarding claims 34 and 77, the arguments analogous to those presented above for claim 31 are applicable to claims 34 and 77. Caspi discloses the high-sure/low-sure classifier including a low-sure region that to a high degree of confidence represents only substrate, a high-sure region that to a high degree of confidence represents only conductor located on the top surface of the electrical circuit, and a third region which is neither high-sure nor low-sure (Col. 18, lines 14-63).

Regarding claims 35, 78, and 79, Hara does not appear to disclose employing the high-sure/low-sure image to selectively modify an interim image to produce an enhanced representation of the circuit. However, Caspi teaches that it is known to employ the high-sure/low-sure image to selectively modify an interim image to produce an enhanced representation of the circuit (Col. 18, lines 47-56). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the images disclosed by Hara to include employing the high-sure/low-sure image as taught by Caspi because it allows for further distinction between the substrate and conductors thereby increasing accuracy.

Regarding claims 36 and 80, the arguments analogous to those presented above for claim 26 are applicable to claims 36 and 80. Caspi discloses convolving the image with a function approximating a 2-D Laplacian of a Gaussian function (Abstract).

Regarding claims 37 and 81, Hara does not recognize determining in the first image data approximate locations of transitions between image regions having distinguishable optical characteristics and modifying comprising removing undesired ones of the transitions. However, Caspi teaches that it is known to determine the approximate locations of transitions between image regions having distinguishable optical characteristics (Col. 2, lines 7-17; Col. 3, lines 17-33 and modifying comprising removing undesirable ones of the transitions including overriding at least part of the convolved data (Col. 9, lines 55-67, Col. 10, lines 1-21). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the modifying disclosed by Hara to include determining the locations of transitions and removing undesired ones as taught by Caspi because such transitions represent the edges of lines in order to facilitate in differentiating between the substrate and the conductors to improve the defect detection accuracy.

Regarding claims 38 and 82, the arguments analogous to those presented above for claim 26 are applicable to claims 38 and 82. Caspi discloses the enhanced representation is a binary representation of the electrical circuit (Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the images disclosed by Hara to include enhanced binary representation as taught by Caspi because it provides a greater resolution than the gray scale image (Col. 2, lines 66-67, Col. 3, lines 1-16).

Regarding claims 39 an 83, the arguments analogous to those presented above for claim 26 are applicable to claims 39 and 83. Caspi disclose the enhanced representation is a representation of contours in the electrical circuit, which indicate approximate locations of transitions between regions in the circuit exhibiting distinguishable optical characteristics (Col. 16, lines 7-18). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the images disclosed by Hara to include enhanced contour representation as taught by Caspi because it is well known in the art and allows for increased differentiation between the substrate and the conductors.

Regarding claims 40 and 84, the arguments analogous to those presented above for claim 37 are applicable to claims 40 and 84. Note, Caspi detects transitions between substrate and conductors on a top surface (Figure 5), thereby excluding transitions between substrate and other conductors, as claimed.

Regarding claims 41 and 85, Hara discloses analyzing for defects in the electrical circuit (Col. 10, lines 14-20).

Regarding claims 42 and 86, Hara discloses the first and second images are acquired with at least one imager 11 comprising at least two different types of optical detectors 19, 15' arranged to view at least a portion of the electrical circuit illuminated by at least one illuminator (Figure 2).

Regarding claims 43 and 87, Hara discloses the first and second images are generally spatially coincidental and each of the first and second images are in a different spectral range (Col. 9, lines 28-35).

11. Claims 28, 33, 71, and 76 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hara et al. (4,692,690) in view of Caspi et al. (5,774,573) as applied to claims 26, 31, 69, and 74 above, and further in view of Elyasaf et al. (6,175,645).

Regarding claims 28 and 71, Caspi discloses it is known to include enhancing contrast between at least some parts of the image data representing corresponding parts of the electrical circuit thereby decreasing artifacts (Col. 3, lines 57-65; Col. 8, lines 7-30). Caspi further discloses that more complex circuit boards will contain regions where the contrast between the tracks and substrate differs (Col. 13, lines 6-22) and it is necessary to redefine certain regions as substrate portions (Col. 13, lines 23-59). Hara and Caspi do not appear to recognize a non-opaque substrate. However, Elyasaf et al. ("Elyasaf") teaches inspecting electrical circuit formed on different surfaces of a non-opaque substrate including obtaining image data relating to at least part of an electrical circuit (Abstract). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the enhanced contrast representation disclosed by Hara and Caspi to include non-opaque characteristics as taught by Elyasaf because it is well known and allows for a more accurate inspection.

Regarding claims 33 and 76, the arguments analogous to those presented above for claims 32 and 28 are applicable to claims 33 and 76.

Response to Arguments

12. Applicant's arguments with respect to claims 1, 29, 44, and 72 have been considered but are moot in view of the new grounds of rejection.

13. Applicant's arguments filed 04/02/04 regarding claims 26, 31, 69, and 74 have been fully considered but they are not persuasive.

Summary of Applicant's Arguments: Regarding claims 26 and 69, Hara employs a fluorescent image and an image formed by reflected infrared light. The images are processed and compared to each other to detect pattern defects on the basis of a difference between the images. Caspi produces a binary bit map of an object at a resolution greater than the resolution of an acquired gray scale image of the object. The improvement is obtained by determining a sub-pixel location of edges by convolving a gray level image with an approximation of the second derivative of a 2-D Gaussian function. In the vicinity of the edges, linearly interpolated zero-crossings in the convolved image indicate a precise edge location. Pixels suitable for identifying edges are determined by a threshold test. Nothing in the combination of Hara and Caspi shows providing an enhanced contrast representation of an electrical circuit by non-linearly combining the first and second image data.

Regarding claims 31 and 74, nothing in the combination of Hara and Caspi shows non-linearly combining first and second image data to form a pseudo image, and supplying the pseudo-image to a high-sure/low-sure region classifier. In particular, nothing in Hara anticipates non-linearly image enhancement, and the high-sure/low-sure region classifier of Caspi employs a straightforward threshold test.

Examiner's Response: Regarding claims 26 and 69, Hara discloses obtaining a first image (Figure 16) and a second image (Figure 17) and combining the two images (Figure 19) (Col. 8, lines 46-68, Col. 9, lines –27). The teachings of Caspi are relied on for providing an enhanced contrast representation by non-linearly combining an image. Caspi discloses using

larger pixels to acquire the gray scale image (Figure 4) than are used in constructing the bit map while maintaining resolution accuracy (Col. 6, lines 35-46). Convolver 47 carries out on the gray scale image a 2-D convolution with the second derivative of a Gaussian function, or an approximation thereof, producing a convolved image having signed values (Col. 8, lines 7-12). Thereby, the image is non-linearly combined. In order to make a direct comparison with Figure 4, the number of pixels in the bit map that will be reproduced using the convolved image is increased to the number of pixels in the bit map used with the conventional apparatus. This is done by linear interpolation of the convolved image (Col. 8, lines 31-45). The nature of convolving with the derivative of the Gaussian is such that near a zero-crossing, the convolved image varies linearly (Col. 9, lines 11-19). This only entails that the result of the combination varies linearly. Caspi discloses a non-linear method of enhancing contrast. The combined teachings of Hara and Caspi meet the claimed limitation.

It is further submitted that while only the preamble indicates inspecting electrical circuits it is not given any patentable weight. The only claimed limitation is a well known methodology of combining two images. The concept of non-linearly combining images is not patentable. It is routinely utilized in the art to mix similar images of essentially the same scene to create a resulting image that better conveys some attribute of the scene.

Regarding claims 31 and 74, as indicated above Hara discloses obtaining a first image (Figure 16) and a second image (Figure 17) and combining the two images (Figure 19) (Col. 8, lines 46-68, Col. 9, lines –27). The teachings of Caspi are relied on for providing an enhanced contrast representation by non-linearly combining an image. Hara is not relied on for non-linearly image enhancement. The combined teachings of Hara and Caspi meet the claimed

limitation of non-linearly combining the first and second images to form a pseudo image. Caspi further discloses supplying the image to a high-sure/low-sure region classifier (Col. 18, lines 38-56).

It is further submitted that while only the preamble indicates inspecting electrical circuits it is not given any patentable weight. The only claimed limitations are well known methodologies of combining two images and applying two thresholds. The concept of non-linearly combining images is not patentable. It is routinely utilized in the art to mix similar images of essentially the same scene to create a resulting image that better conveys some attribute of the scene.

Conclusion

14. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Other Prior Arts Cited

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Longbothom et al., "X-Ray Stereo Imaging Technique for Disparity Analysis," IEEE, 1995, pages 24-26.

Contact Information

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Virginia M Kibler whose telephone number is (703) 306-4072. The examiner can normally be reached on Mon-Thurs 8:00 - 5:30 and every other Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Virginia Kibler
06/23/04

MEHRDAD DASTOURI
PRIMARY EXAMINER